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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/865,006 | 05/23/2001 | Krishna Parat | 042390P7462D | 4672 |

7590 11/01/2005
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EXAMINER

DIAZ, JOSE R

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2815

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

| | | | |
|------------------------------|-----------------|--------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 09/865,006 | PARAT ET AL. | |
| | Examiner | Art Unit | |
| | José R. Díaz | 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4 and 9-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4 and 9-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 4 is rejected under 35 U.S.C. 102(e) as being anticipated by Inoue (US Pat. No. 6,284,624 B1).

Regarding claim 4, Inoue teaches a method comprising:

forming a trench (4) in a silicon substrate (1), said trench having one or more upper corners (see fig. 2);

growing an oxide (6) in said trench (see fig. 13);

removing all of said grown oxide (6) from said trench (see fig. 14);

growing a second oxide (23) in said trench (see fig. 15);

filling said trench with a dielectric (8) (see fig. 16);

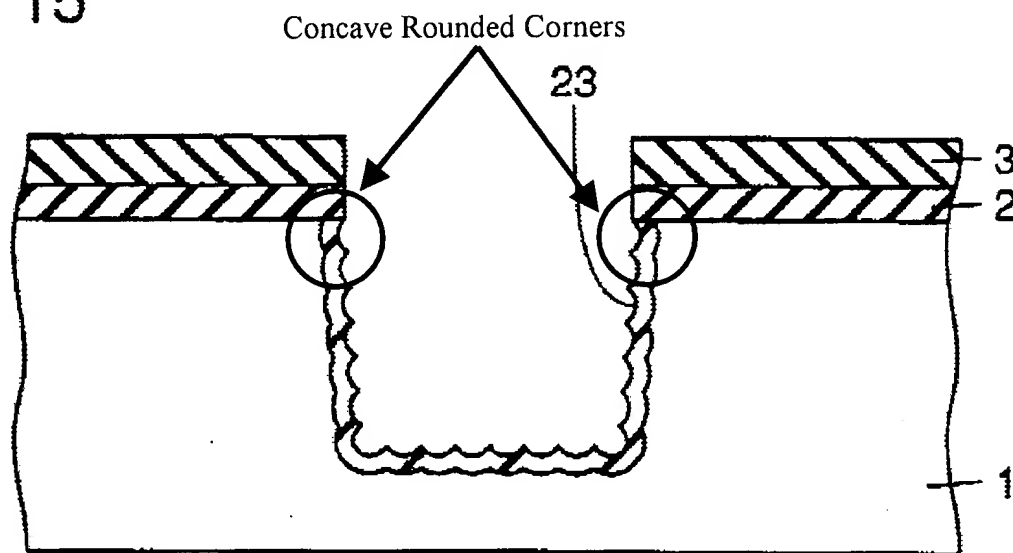
growing a tunnel oxide (10) on said silicon substrate adjacent to said dielectric filled trench (see fig. 17);

forming a first polysilicon layer (26) on said tunnel oxide (see fig. 25);

forming an intepoly dielectric (27) on said first polysilicon layer (see fig. 25);

forming a polysilicon control gate (28) on said interpoly dielectric (see fig. 25);
wherein after the growing the second oxide, the one or more upper corners of said trench are round (consider the concave rounded corners shown in figure 15, below).

FIG. 15



3. Claims 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Teng et al. (US Pat. No. 4,890,144).

Regarding claim 9, Teng et al. teaches a method comprising:

forming a trench (18) in a semiconductor substrate (12) between a first cell and a second cell (please consider the portions of the substrate that have isolation regions 16, which are located at the right and left sides of trench (18). See fig. 4);

forming an opening in a first dielectric material (20) in the trench (please note that layer 20 was removed to expose the bottom surface of the trench. See fig. 5 and col. 4, lined 40-41);

forming a second dielectric material (24) in the opening in the first dielectric material (see fig. 5)

forming a shared source region (30) through the opening between the first cell and the second cell (see fig. 5);

forming sidewall spacers with the second dielectric material (24) (please note that layer 24 is patterned in figure 6 to expose the bottom surface of the trench, so that layer 24 remains only on the sidewalls of the trench).

Regarding claim 10, Teng et al. further teaches growing a thermal oxide (32) in the trench (see fig. 6).

Regarding claim 11, Teng et al. further teaches forming the second dielectric material (24) with a chemical vapor deposition (CVD) process (see col. 4, lines 40-44).

Response to Arguments

4. Applicant's arguments filed August 16, 2005 have been fully considered but they are not persuasive.

5. With regards to Inoue, applicant argued that the reference fails to teach a trench having rounded corners as now claimed. However, the examiner disagrees. Figure 15

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of Inoue clearly shows rounded corners having concave shape. Therefore, Inoue anticipates the claimed limitation.

6. With regards to Teng et al., applicant argued that region (30) is not a shared source region, as recited in claim 9. However, the examiner disagrees. Teng et al. teaches two devices (46 and 50) that share the same region (30) (fig. 15 and column 3, lines 51-52). In addition, Teng et al. teaches that region (30) is either a source or a drain region (column 3, lines 51-52). Thus, Teng et al. clearly anticipates the claimed invention by teaching a shared region that can be used as the source region for both devices.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

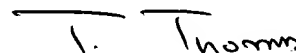
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Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Díaz whose telephone number is (571) 272-1727. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TOM THOMAS
SUPERVISORY PATENT EXAMINER



José R. Díaz
Examiner
Art Unit 2815

T. T. 10-2-05